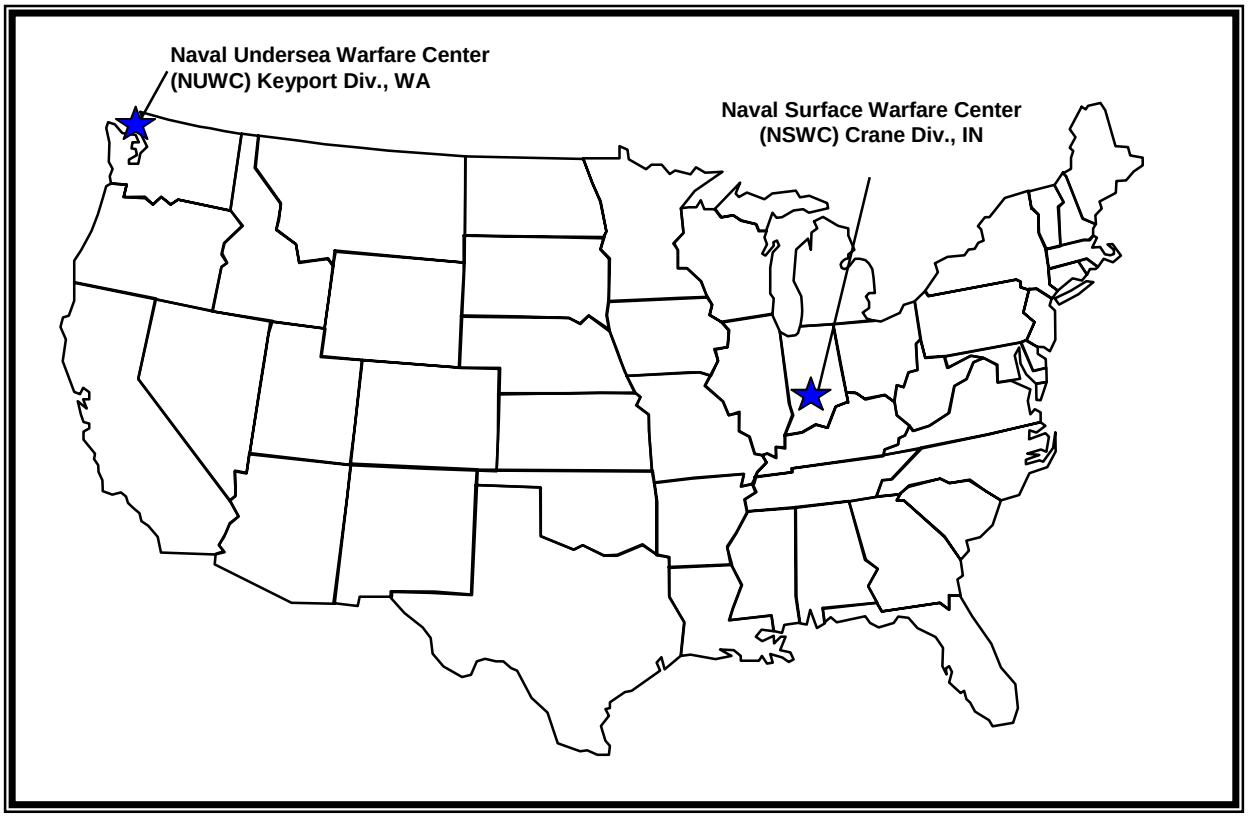
Warfare Centers



2.4 WARFARE CENTER ACTIVITIES

The Naval Surface Warfare Center (NSWC) is comprised of five divisions at Carderock, Crane, Dahlgren, Indian Head, and Port Hueneme, as well as one direct reporting station, Naval Warfare Assessment Station, Corona. Only Crane is included in this issue since it is the only depot maintenance activity. The Naval Undersea Warfare Center (NUWC), has only one station, the NUWC Keyport Division, which is used in this document. These activities may be referred to as the Naval Warfare Center activities for purposes of this document only.

These activities provide the organic capability for repair and overhaul of Navy weapons from small arms to major shipboard weapons and combat systems. They provide selected manufacturing capabilities for components to sustain and modernize existing weapons systems as well as maintain unique repair capabilities for electronic components of these modern weapon systems. Air, surface, and undersea launched missile systems, torpedoes, mine systems, and various control systems are included. The two depot activities addressed in this section are shown on the map above.

2.4.1 Naval Undersea Warfare Center (NUWC), Keyport Division

2.4.1.1 OVERVIEW

History:

- First commissioned in 1914 as the Pacific Coast Torpedo Station.
- Located at Keyport because of its access to protected deep water for testing and firing torpedoes.
- Facility has evolved to adapt to the requirements of undersea warfare (USW). Over the years, the name of the command has changed to Naval Torpedo Station (1930), Naval Undersea Warfare Engineering Station (1978), and most recently Naval Undersea Warfare Center, Division Keyport (1992).
- As requirements for support of increasingly sophisticated USW weapon systems evolved, undersea ranges with 3-D instrumentation have been developed for test and evaluation at sites in the Pacific Northwest, southern California, and Hawaii.
- Permanent detachments are sited in San Diego and Hawaii associated with test and evaluation sites. An additional detachment in Hawthorne, NV performs functions related to conventional underwater mines.
- Today, NUWC Division Keyport accomplishes a wide range of complementary tasks in depot maintenance, test and evaluation, and in-service systems support for undersea systems.
- NUWC, Keyport operates the Navy's assigned depot facilities for maintenance of torpedoes, selected combat systems and undersea targets.

Mission:

- NUWC, Division Keyport is tasked by the Naval Sea Systems Command to provide test and evaluation, in-service engineering, maintenance and repair, fleet support, and industrial base support for designated systems.

Location:

- The primary site of NUWC Division Keyport is located approximately 14 miles north of Bremerton, Washington on the Kitsap Peninsula across Puget Sound from Seattle.
- Detachment Hawaii is headquartered at Lualualei, south and west of Pearl Harbor on Oahu.
- San Diego Detachment is located south of NAS Miramar in southern California.
- Detachment Hawthorne is located approximately 130 miles south and east of Reno, Nevada.

Size:

- The total complex of NUWC Division Keyport occupies 1,368 acres.
- Mission operations are conducted within 397 buildings with a footprint of 2,567,000 SF.
- Total plant value is approximately $214M.
- Total plant equipment value is approximately $214M.
- The complex is distributed among four principal sites.

    - Puget Sound Site: Facilities in the Puget Sound region occupy 1,344 acres with 319 building providing 2,068,000 SF.
    - Hawaii Site: Facilities in Hawaii occupy 6 acres with 26 buildings providing 94,000 SF.
    - Southern California: Facilities in southern California occupy 3 acres with 10 buildings providing 61,000 SF of operating space.
    - Hawthorne Site: Facilities in Hawthorne, Nevada occupy 15 acres with 42 buildings providing 344,000 SF of operating space.

Workforce/Payroll:

- As of end FY98, NUWC Division Keyport employed 1,453 civilian employees with 32 military personnel on board.
- The FY98 payroll was approximately $92M for civilian salaries and benefits.

Transportation Access:

- NUWC Division Keyport facilities are readily accessible by railway, waterway, highway, and air.
- Burlington Northern Railroad provides direct rail service to nearby Submarine Base Bangor and Puget Sound Naval Shipyard.
- Navy piers provide access to the sea at Keyport with deep-water piers available at Submarine Base Bangor and Puget Sound Naval Shipyard.
- Major commercial ports for commercial shipping are available in both Seattle and Tacoma, Washington.
- Four-lane highway, leading to major interstate highways (I-5 and I-90) is accessible only two miles from the Keyport Base.
- SEATAC International Airport, only ninety minutes away by highway, is the principal national and international terminus for air traffic for the entire Pacific Northwest region.
- McChord Air Force Base provides military airlift access only sixty minutes away.

Environmental Programs:

The Resource Protection Department, Code 80, provides Command-wide oversight and coordination of environmental programs. The department reports directly to the Commander, Naval Undersea Warfare Center Division, Keyport, and works closely with the Pacific Northwest Regional Commander (COMNAVBASE Seattle) to ensure compliance with federal, state, and local environmental regulations. Within this department, a Safety Division provides oversight for occupational safety and health, explosive safety, and emergency response. An Environmental Division, manages compliance permitting, installation restoration and community relations, waste water operations, hazardous waste, pollution prevention, and natural resources.

Recent environmental enhancements of Keyport structures include a Hazardous Materials Storage Facility, completed in 1990, a Treatment, Storage, and Disposal Facility, which opened in 1996 and a new Regional Metal Preparation Facility completed in 1998. In 1994, wetlands were enhanced with the planting of wetlands vegetation; in 1996, a program of water-wise landscaping techniques was implemented and continues; in 1998, the former plating plant site cleanup will be complete, and in 1999, the landfill cleanup remedies will be in place, notably the innovative use of poplar trees as a source control remedy for contaminated groundwater.

The primary site of Naval Undersea Warfare Center Division, Keyport is located on a small peninsula at Keyport, Washington. It is bordered by Liberty Bay on the east and north, and by the community of Keyport (population 350) to the south and west. Ecosystems at Keyport include mixed evergreen forests, saltwater marsh areas, and tidal shorelines. Many birds and a variety of wildlife live in the vicinity. An eagle nest is located one mile south of the base, and in 1996 an active nest was discovered near base housing. Clam and oyster beds are abundant in the area. The Suquamish Tribe of Native Americans runs a fisheries enhancement program to raise chum and Chinook salmon in streams that drain to Liberty Bay.

2.4.1.2 TECHNOLOGICAL ENHANCEMENTS

Repair Techniques/Processes:

- Aluminum Laser Cladding: NUWC Keyport is developing applications of laser cladding of aluminum, in partnership with ARL/Penn State. The resulting processes will be applied to repair of aluminum component and shell structures for undersea warfare systems. This repair technology will be implemented at NUWC Keyport in FY99.
- NUWC Keyport is developing an innovative multi-layered circuit board reverse engineering process. This will allow for exact replication of existing undocumented circuit boards. Traditional reverse engineering processes result in a circuit board electronically the same, but the physical layout in not identical to the original.

2.4.1.3 COMMODITIES AND PRODUCTS

Communications/Electronics
Electronics
General Purpose
Shelter/Housing
Support Equipment

General Support Equipment

Electronic Test Equipment

Machine Tools

Missile
Accessories and Components
Support & Launch

Ordnance

Conventional Arms & Explosives
- Torpedoes, Targets, Undersea Vehicles
- Undersea Countermeasures
- Acoustic transducers
- Torpedo Warheads0

2.4.1.4 PROCESSES AND TECHNOLOGIES

Cleaning/Stripping:

- Specialized cleaning and stripping processes (liquid and abrasive) tailored to supporting maintenance, prototyping, and test and evaluation for Undersea Warfare Systems (USW) systems.

  - Degreasing
  - Glass Media Blast
  - Non-Hazardous Chemicals
  - Plastic Media Blast
  - Sodium Bicarbonate
  - Ultrasonic
  - Vapor Degreaser

Fabrication/Repair

- Specialized CAD/CAM processes for CNC and metalworking (forming, machining, milling, drilling, turning, cutting) tailored to supporting maintenance, prototyping, and test and evaluation for Undersea Warfare Systems (USW) systems.

- Specialized metal finishing and treatment processes tailored to supporting maintenance, prototyping, and test and evaluation for Undersea Warfare Systems (USW) systems.
- Specialized electronics test, repair and assembly processes and technology tailored to supporting maintenance, prototyping, and test and evaluation for Undersea Warfare Systems (USW) systems.

Fabrication/Repair

CAD/CAM
Artwork-Printed Circuit Board
CNC & NC Programming
Drafting
Drilling/Lathe/Punch
- Engineering Analysis
- Engineering Design/Drawings
- Forming/Machining/Milling
- Sheetmetal
- Certified Soldering
- Chemical Milling
- CNC & NC Programming
- CNC Drilling
- CNC Forming/Machining/Milling
- CNC Lathe/Punch
- Coaxial Cable
- Cutting - Oxyfuel
- Cutting - Water Jet
- Electronic ATE
- Metal Finishing

Painting - Liquid Spray
Painting - Powder Coat
- Photo Etching
- Plastic Injection
- Plating
- Anodize
- Anodizing
- Anodizing (MIL-A-8625 Type I, II, III)
- Cadmium
- Gold
- Gold/Silver
- Nickel
- Rhodium
- Silver
- Tin/Lead

Printed Circuit Board
Robotic Auto Cleaning System
Robotic Refueling/Defueling
Test Program Sets
Tool and Die

Fabrication/Repair

Welding - Arc
Welding - Electron Beam
Welding - TIG, MIG
Wiring Harness

Test and Inspection

- Specialized environmental test processes tailored to supporting maintenance prototyping, and test and evaluation for Undersea Warfare (USW) systems.

- Specialized inspection and failure analysis processes tailored to supporting maintenance, prototyping, and test and evaluation for Undersea Warfare (USW) systems.

Calibration
Eddy Current
Electron Microscope
Electronic ATE
- 3-Axis Motion Simulator
- AN/USM-636 CASS
- Analog
- Digital
- Ditmco
- GenRad
- Teradyne
- Electrostatic Discharge

Environmental Vibration
Eprom/Prom Programming
Flexible Machining Cell
Forming/Machining/Milling
Hybrid Microcircuit
Fiber Optics
Fluorescent Penetrant - Manual
Hydrostatic
Laser Measuring
Spectrographic Analysis
Stress
Test Tank
Test Tank - Automated Acoustic
Ultrasonic - Manual
Undersea Range - Instrument
X-Ray
X-Ray - Real Time

2.4.2 Crane Division, Naval Surface Warfare Center (NSWC), Crane, Indiana

2.4.2.1 OVERVIEW

History:

- Originally selected as an inland base for loading and storing ammunition. Commissioned on 1 December 1941 as the Naval Ammunition Depot, Burns City, Indiana.
- In May 1943, renamed the U.S. Naval Ammunition Depot, Crane in honor of Commodore William M. Crane, first Chief of the Bureau of Ordnance.
- On 1 July 1975 the depot's name was changed to the Naval Weapons Support Center, Crane (NWSCC) to reflect the expanding mission that included engineering and maintenance support of weapon systems, components, and various other tasks of a specialized nature.
- In 1977 DOD the Crane Army Ammunition Activity (a single manager for conventional ammunition) was established as a tenant at NWSCC to perform the loading, assembly and storage of ammunition.
- In 1992 Crane was designated a division of the newly established Naval Surface Warfare Center. The Crane Division was an organizational combination of Naval Weapons Support Center, Crane, Indiana, and the Naval Ordnance Station, Louisville, Kentucky.
- On 18 August 1996, the Naval Ordnance Station Louisville (NOSL) was privatized. This was the result of a decision by the 1995 Defense Base Realignment and Closure Commission to close NOSL.

Mission:

- To provide low cost quality and responsive acquisition engineering, logistics, and maintenance for the fleet's weapon and electronic systems, ordnance, and associated equipment and components. This will be accomplished in partnership with industry, academia, and government activities. The Crane Division has developed the ability to manage acquire, assess, test, evaluate, repair (intermediate and depot level), and provide engineering and field support for components, equipment and systems.
- Numerous electronic systems are repaired at Crane as well as night vision equipment and small arms. A partial listing of systems is:

AN/ALQ-99	Tactical Jamming System
AN/ALQ-149	Communications Jammer
AN/ALQ-165	Airborne Self Protect Jammer
AN/ASQ-155	Ballistics Computer Set
PU-726.ALQ-99	Ram Air Turbine
AN/USQ-113	Communications Jammer
AN/SPS-40,48,49	Radar
AN/TPS-59	Radar
OE-120	Identification Friend of Foe
MK86	Gun Fire Control System
AN/SLQ-32	Countermeasures Set
AN/WLR-1H	Countermeasures Receiving Set

AN/ULM 4	Electronic Countermeasures
AN/SSQ 82	Shipboard Emission Monitor Control Set
AN/AVS 6	Aviator Goggles
MXU 810	Catseye Aviators Goggles
AN/PVS 5/5/7/11	Weapon Sight/Night Vision Goggles
	Surveillance Scopes
SOFLAM	Marker Laser
AN/PAQ 4	Weapon Aiming Laser
AN/PAS 18	Stinger Night Sight
AN/AAQ 22	Navigational Thermal Imaging System Navy
	Mast
	Mounted Sight

Location:

- Situated in south central Indiana. 90 miles south of Indianapolis, Indiana, via State Road 37 through Bloomington, Indiana, to State Road 45. Evansville, Indiana, on the Ohio River, is 100 miles southwest of the division; Louisville, Kentucky is 100 miles southeast, also on the Ohio River.

Size:

- Occupies a total of 62,467 acres
- 862 buildings accounting for 5,908,760 square feet
- 1,705 magazines accounting for 4,958,131 square feet.
- Estimated replacement value of plant equipment is $392M
- Current plant value is $1.4B

Workforce/Payroll:

- As of 30 June 1998, total civilian work force including tenants was 3,820 and 58 military.
- Projected yearly payroll for FY98 is $200.3M.
- Approximately 95 percent of the work force are in critical skills of electronic and mechanical technicians and engineers.

Transportation Access:

- **Air Access**
    - Approximately 90 miles north is Indianapolis International Airport. A Federal Express hub, an U.S. Postal Service Eagle Air hub and a $800 million dollar United Airlines air maintenance service hub are located there.
    - Access to Air - Located Approximately 100 miles south is Standiford Field at Louisville, Kentucky is. It is serviced by 18 different airlines with over 100 flights per day. United Parcel Service maintains a national airfreight hub site there.

- **Rail Access**

  - The Crane Division has over 150 miles of railroad track providing access to the facility's storage areas. This track accommodates the 89-foot flat cars used when shipping Milvans and Seavans.
  - Serviced by the Soo Line which interconnects Chicago, Kansas City, and Louisville.
  - The main north and south CSX line runs through nearby Evansville, Indiana.

- **Waterway Access**

  - The Ohio River is approximately 80 miles to the south of the Crane Division. It is the major waterway to Cincinnati, Pittsburgh, St. Louis, Memphis, New Orleans, and the Gulf of Mexico seaports.
  - Clark Maritime Center in Jeffersonville, Indiana covers 830 acres and offers storage, towing and fleeting, barge cleaning and repair, switching, and heavy lifting up to 450 tons.
  - Ports available in Evansville, Indiana and the Great Lakes area.

- **Highway Access**

  - Three major interstates (I-64, I-65, and I-71 are 75 - 100 miles south of the Crane Division.
  - The Indianapolis area, north of Crane Division, is the hub for four major interstate highways (I-70, I-74, I-65, and I-69).

- **Motor Carriers**

  - Over 40 motor carriers service the region.
  - Service provided to all 48 contiguous states as well as Canada and Mexico.
  - Allows carriers to pick up additional freight as trucks pass through the area.

Environmental Constraints:

- The Environmental Protection Department within the Public Works Directorate is responsible for ensuring compliance to environmental at the Crane Division.
- The Crane, Division currently has 32 Solid Waste Management Units (SMMU) which are undergoing various stages of corrective action.
- The Crane Division is located in an attainment/unclassified air quality region. It is located in the rural rolling hills of southwestern Indiana. The boundaries of the activity are predominantly hardwood forests and farmland.

2.4.2.2 TECHNOLOGY ENHANCEMENTS

- **Manufacturing Techniques/Processes:**

  - Polyimide/Cap kevlar research and development
  - Electrolytic recovery (elimination of toxic sludge)
  - Full-build electroless research and development

- Multi-chip module fabrication research and development
- Effects of material on dielectric constant analysis
- Closed-loop hazardous waste system

- **Repair Techniques/Processes:**

  - 6300 foot far field test range
  - Night vision/electro-optics facility
  - Expansion of chemical/biological warfare detection facility
  - Naval mast mounted sight facility expansion
  - Visual analysis system Installation
  - Thermal repair facility expansion
  - 100 meter small arms and minor calibration test range
  - 1000 meter small arms and minor calibration test range
  - Automated wire wrap machine
  - Airborne radar test and repair
  - Consolidated automated support system (CASS)
  - High speed microwave transmit/receive module testing
  - Sensor test system suite
  - Test support system
  - Automated laser test
  - Microwave components maintenance

2.4.2.3 COMMODITIES AND PRODUCTS

Aircraft
Accessories and Components
Avionics
General Purpose
Support Equipment

Combat Vehicles

Accessories and Components
Communications
Fire Control
General Purpose
Support Equipment

Construction Equipment

Accessories and Components
Communications
Electronics

Ordnance

Small Arms

Ships

Accessories and Components
Communications & Electronics
Fire Control
General Purpose

Communications/Electronics
Accessories and Components
Electronics
General Purpose
Radar
Support Equipment

General Support Equipment

Electronic Test Equipment
Heating & Air Conditioning

Missile
Accessories and Components
Guidance System
Missile Frame
Payload System
Solid Propulsion
Support & Launch
Surface Command & Control

2.4.2.4 PROCESSES AND TECHNOLOGIES

Cleaning/Stripping
Citric Acid
Glass Media Blast
Grit Blast
Hazardous Chemicals
Non-Hazardous Chemicals
Non-Hazardous Chemicals
Plastic Media Blast
Sand Blast
Steam
Ultrasonic
Vapor Degreaser
Vibratory Finishing

Fabrication/Repair

Air Conditioning - Electronic Controls
CAD/CAM
- Artwork-Flat Wire Cables
- Artwork-Printed Circuit Board
- CNC & NC Programming
- Drafting
- Drilling/Lathe/Punch
- Engineering Analysis
- Engineering Design/Drawings
- Forming/Machining/Milling
- Printed Circuit Board
- Sheetmetal

Fabrication/Repair
Certified Soldering
Chemical Forming/Machining/MillingGrit
Class 100,000 Clean Room
CNC & NC Programming
CNC Drilling
CNC Forming/Machining/Milling
CNC Lathe/Punch
Coaxial Cable
Cutting - Laser
Cutting - Oxyfuel
Cutting - Plasma
Electronic ATE
Electronic Controls
Engineering Analysis
EProm/Prom Programming
Fiber Optics
Fiberglass Refurbishing
Flame Spray
Forming/Machining/Milling
Heat Treating
Hybrid Microcircuit
Hydrogen Brazing
Interface Devices Design and Repair
Investment Casting
Metal Finishing
Metrological
Microwave/Vacuum Tube

Fabrication/Repair
Milling
Optics
Painting - Electro
Painting - Liquid Spray
Painting - Powder Coat
Phosandodize
Photo Etching
Plastic Injection
Plating - Anodizing
Plating - Anodizing (MIL-A-8625 Type I, II, III)
Plating - Cadmium
Plating - Electro
Plating - Gold
Plating - Gold/Nickel
Plating - Gold/Silver
Plating - Nickel
Plating - Nickel/Boron
Plating - Tin/Lead
Precision Balancing
Printed Circuit Board
Reverse Engineering
Rubber Products
Test Program Sets
Tool and Die
Welding - Arc
Welding - Electron Beam
Welding - Laser
Welding - TIG, MIG
Wiring Harness

Test and Inspection
Anechoic Antenna Test Chamber
Antenna Test Range
Bearing Process
Calibration
Data Collection/Validation
Eddy Current
Electron Microscope
Electronic ATE

Test and Inspection
Electronic ATE - Analog
Electronic ATE - Digital
Electronic ATE - Ditmco
Electronic ATE - GenRad
Electronic ATE - RF Microwave
Electronic ATE - Teradyne
Electrostatic Discharge
Environmental Vibration
Fluorescent Penetrant
Fluorescent Penetrant Manual

Gymnasticator
Hydraulic Systems
Indoor Range
Integration Systems Testing
Laser Measuring
Laser Test Range
Magnetic Particle
NDI Magnetic Particle
Quality Evaluation
Radiography - Gamma
Spectrographic Analysis
Stress
Tempest Test
Type II Calibration Laboratory
Ultrasonic - Manual
Video Inspection Probe
Winch & Ram Test
X-Ray - Film
X-Ray - Real Time